the terms "row" and "column," "first dimension" and "second dimension," or "first axis" and "second axis" as may be used herein are intended to encompass not only orthogonal grids, but the intersecting traces of other geometric configurations having first and second dimensions (e.g. the concentric and radial lines of a polar-coordinate arrangement).

[0097] At the "intersections" of the traces, where the traces can pass above and below each other (but do not make direct electrical contact with each other), the traces can essentially form two electrodes. Each intersection of row and column traces can represent a capacitive sensing node and can be viewed as picture element (pixel) **1826**, which can be particularly useful when multi-touch panel **1824** is viewed as capturing an "image" of touch. (In other words, after panel subsystem **1806** has determined whether a touch event has been detected at each touch sensor in multi-touch panel **1824**, the pattern of touch sensors in the multi-touch panel at which a touch event occurred can be viewed as an "image" of touch (e.g. a pattern of fingers touching the panel).) When the two electrodes are at different potentials, each pixel can have an inherent self or mutual capacitance formed between the row and column electrodes of the pixel. If an AC signal is applied to one of the electrodes, such as by exciting the row electrode with an AC voltage at a particular frequency, an electric field and an AC or signal capacitance can be formed between the electrodes, referred to as Csig. The presence of a finger or other object near or on multi-touch panel **1824** can be detected by measuring changes to Csig. The columns of multi-touch panel **1824** can drive one or more analog channels **1808** in panel subsystem **1806**. In some embodiments, each column can be coupled to one dedicated analog channel **1808**. However, in other embodiments, the columns can be couplable via an analog switch to a fewer number of analog channels **1808**.

[0098] The touchscreen stackups described above can be advantageously used in the system of FIG. **18** to provide a space-efficient touch sensor panel and UI.

[0099] FIG. **19***a* illustrates exemplary mobile telephone **1936** that can include the touchscreen stackups and computing system described above according to embodiments of the invention. PSA **1934** can be used to bond sensor panel **1924** to display device (e.g. LCD module) **1930**. FIG. **19***b* illustrates exemplary digital audio/video player **1940** that can include the touchscreen stackups and computing system described above according to embodiments of the invention. The mobile telephone and digital audio/video player of FIGS. **19***a* and **19***b* can advantageously benefit from the touchscreen stackups described above because the touchscreen stackups can allow these devices to be smaller and less expensive, which are important consumer factors that can have a significant effect on consumer desirability and commercial success.

[0100] Although the present invention has been fully described in connection with embodiments thereof with reference to the accompanying drawings, it is to be noted that various changes and modifications will become apparent to those skilled in the art. Such changes and modifications are to be understood as being included within the scope of the present invention as defined by the appended claims.

What is claimed is:

1. A multi-touch sensor panel, comprising:

a glass subassembly having a front side capable of being touched, and a back side opposite the front side;

a plurality of first traces of a first substantially transparent conductive material formed on the back side of the glass subassembly;

a plurality of second traces of a second substantially transparent material; and

a dielectric material coupled between the first traces and the second traces;

wherein the second and first traces are oriented to cross over each other at crossover locations separated by the dielectric material, the crossover locations forming mutual capacitance sensors for detecting one or more touches on the front side of the glass subassembly.

2. The multi-touch sensor panel of claim **1**, wherein the first and second substantially transparent conductive materials are the same.

3. The multi-touch sensor panel of claim **1**, further comprising a mask layer formed on the back side of the glass subassembly for hiding electrical interconnect.

4. The multi-touch sensor panel of claim **1**, wherein the dielectric material is formed over the first traces on the back side of the glass subassembly to create a planarization layer for use in forming subsequent conductive layers.

5. The multi-touch sensor panel of claim **4**, wherein the second traces are formed over the dielectric material on the back side of the glass subassembly.

6. The multi-touch sensor panel of claim **5**, further comprising a polyethylene terephthalate (PET) subassembly coupled to the glass subassembly, the PET subassembly having a continuous sheet of conductive material formed thereon for shielding the first traces.

7. The multi-touch sensor panel of claim **6**, further comprising a liquid crystal display (LCD) module coupled to the PET subassembly.

8. The multi-touch sensor panel of claim **1**, further comprising a polyethylene terephthalate (PET) subassembly coupled to the glass subassembly, the PET subassembly representing the dielectric material and the second traces formed on a bottom side of the PET subassembly.

9. The multi-touch sensor panel of claim **8**, further comprising a chip on glass coupled to the glass subassembly, the chip on glass including sensor panel circuitry.

10. The multi-touch sensor panel of claim **9**, further comprising a liquid crystal display (LCD) module coupled to the PET subassembly.

11. The multi-touch sensor panel of claim **1**, further comprising a polyethylene terephthalate (PET) subassembly coupled to the glass subassembly, the PET subassembly representing the dielectric material and the second traces formed on a top side of the PET subassembly.

12. The multi-touch sensor panel of claim **11**, the PET subassembly having a continuous sheet of conductive material formed on a bottom side for shielding the first traces.

13. The multi-touch sensor panel of claim **12**, further comprising a liquid crystal display (LCD) module coupled to the PET subassembly.

14. The multi-touch sensor panel of claim **1**, the multi-touch sensor panel incorporated into a computing system.

15. The multi-touch sensor panel of claim **14**, the computing system incorporated into a mobile telephone.

16. The multi-touch sensor panel of claim **14**, the computing system incorporated into a digital audio player.

17. A mobile telephone including a multi-touch sensor panel, the multi-touch sensor panel comprising: